AMENDMENTS TO THE CLAIMS

Claims 1-17: (canceled)

18. (previously presented) A memory element structure comprising:

a substrate, and a memory element over the substrate, the memory element including:

a first conductor over the substrate;

a pinned magnetic structure over and electrically connected with said first conductor;

a nonmagnetic layer over said pinned magnetic structure;

a sensing magnetic structure over said nonmagnetic layer, said sensing magnetic structure including an antiferromagnetic layer magnetically coupled to at least one ferromagnetic free layer applying a non-pinning magnetic bias to said at least one free layer; and

a second conductor over and electrically connected with said sensing magnetic structure.

19. (previously presented) The structure of claim 18 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

20. (original) The structure of claim 18 wherein said antiferromagnetic layer includes one or more synthetic layers each comprising two ferromagnetic layers separated by a metal.

21. (original) The structure of claim 18 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

22. (original) The structure of claim 18 wherein said pinned magnetic structure comprises a plurality of layers including at least one pinned layer.

23. (original) The structure of claim 18 wherein said nonmagnetic layer comprises aluminum oxide.

24. (original) The structure of claim 18 wherein said antiferromagnetic layer provides said bias to said ferromagnetic free layer.

25. (original) The structure of claim 24 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

26. (previously presented) A memory element structure comprising:

a pinned magnetic structure over a conductive layer;

a nonmagnetic layer over said pinned magnetic structure;

a free magnetic structure over said nonmagnetic layer, wherein said free magnetic structure comprises an antiferromagnetic layer over a ferromagnetic free layer, said ferromagnetic free layer having a non-pinning magnetic bias applied thereto by the antiferromagnetic layer; and

said pinned magnetic structure, nonmagnetic layer and free magnetic structure being patterned to form said memory element.

27. (previously presented) The structure of claim 26 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

28. (original) The structure of claim 26 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

29. (original) The structure of claim 26 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

30. (previously presented) The structure of claim 26 wherein said free magnetic structure includes at least one sense layer.

31. (previously presented) The structure of claim 26 wherein said pinned magnetic structure includes at least one pinned layer.

32. (original) The structure of claim 26 wherein said nonmagnetic layer comprises aluminum oxide.

33. (original) The structure of claim 26 wherein said bias is provided by said antiferromagnetic layer.

34. (original) The structure of claim 33 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

35. (previously presented) A memory device comprising:

at least one magnetic random access memory element, said magnetic random access memory element comprising:

a pinned magnetic structure over a conductive layer;

a nonmagnetic layer over said pinned magnetic structure;

a free magnetic structure over said nonmagnetic layer, wherein said free magnetic structure comprises an antiferromagnetic layer over a ferromagnetic free layer, said ferromagnetic free layer having a non-pinning magnetic bias applied thereto by the antiferromagnetic layer; and

said pinned magnetic structure, nonmagnetic layer and free magnetic structure being patterned to form said memory element.

36. (previously presented) The device of claim 35 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

37. (original) The device of claim 35 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

38. (original) The device of claim 35 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

39. (previously presented) The device of claim 35 wherein said free magnetic structure includes at least one sense layer.

40. (previously presented) The device of claim 35 wherein said pinned magnetic structure includes at least one pinned layer.

41. (original) The device of claim 35 wherein said nonmagnetic layer comprises aluminum oxide.

42. (original) The device of claim 35 wherein said bias is provided by said antiferromagnetic layer.

43. (original) The device of claim 42 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

44. (previously presented) A processor-based system, comprising:

a processor; and

an integrated circuit coupled to said processor, said integrated circuit including a plurality of magnetic random access memory elements, each of said magnetic random access memory elements comprising:

a pinned magnetic structure over a conductive layer;

a nonmagnetic layer over said pinned magnetic structure;

a free magnetic structure over said nonmagnetic layer, wherein said free magnetic structure comprises an antiferromagnetic layer over a ferromagnetic free layer, said ferromagnetic free layer having a non-pinning magnetic bias applied thereto by the antiferromagnetic layer; and

said pinned magnetic structure, nonmagnetic layer and free magnetic structures patterned to form said memory element.

45. (previously presented) The system of claim 44 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

46. (original) The system of claim 44 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

47. (original) The system of claim 44 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

48. (previously presented) The system of claim 44 wherein said free magnetic structure includes at least one sense layer.

49. (previously presented) The system of claim 44 wherein said pinned magnetic structure includes at least one pinned layer.

50. (original) The system of claim 44 wherein said nonmagnetic layer comprises aluminum oxide.

51. (original) The system of claim 44 wherein said bias is provided by said antiferromagnetic layer.

52. (previously presented) The system of claim 51 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

53. (previously presented) A magnetic memory element comprising:

a free magnetic layer;

a pinned magnetic layer; and

a non-magnetic layer separating said free magnetic layer and said pinned magnetic layer, said free layer comprising a ferromagnetic layer and an antiferromagnetic layer, the antiferromagnetic layer supplying a non-pinning magnetic bias to said ferromagnetic layer.

54. (previously presented) The element of claim 53 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

55. (previously presented) The element of claim 53 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

56. (previously presented) The element of claim 53 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

57. (previously presented) The element of claim 53 wherein said pinned magnetic structure includes at least one pinned layer.

58. (previously presented) The element of claim 53 wherein said nonmagnetic layer comprises aluminum oxide.

59. (previously presented) The element of claim 53 wherein said bias is provided by said antiferromagnetic layer.

60. (previously presented) The element of claim 59 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

61. (previously presented) The structure of claim 18, wherein said pinned magnetic structure has a first direction of magnetization, and said free layer has a second direction of magnetization parallel to said first direction of magnetization.

62. (previously presented) The structure of claim 26, wherein said pinned magnetic structure has a first direction of magnetization, and said free magnetic structure has a second direction of magnetization parallel to said first direction of magnetization.

63. (previously presented) The device of claim 35, wherein said pinned magnetic structure has a first direction of magnetization, and said free magnetic structure has a second direction of magnetization parallel to said first direction of magnetization.

64. (previously presented) The system of claim 44, wherein said pinned magnetic structure has a first direction of magnetization, and said free magnetic structure has a second direction of magnetization parallel to said first direction of magnetization.

65. (previously presented) The element of claim 53, wherein said pinned magnetic layer has a first direction of magnetization, and said free layer has a second direction of magnetization parallel to said first direction of magnetization.

66. (previously presented) A memory element structure comprising:

a substrate, and a memory element formed on the substrate, the memory element including:

a first conductor;

a pinned magnetic structure electrically connected with said first conductor;

a nonmagnetic layer on a side of said pinned magnetic structure opposite said conductor;

a sensing magnetic structure on a side of said nonmagnetic layer opposite said pinned magnetic structure, said sensing magnetic structure including an antiferromagnetic layer magnetically coupled to at least one ferromagnetic free layer producing a non-pinning magnetic bias to said at least one free layer; and

a second conductor electrically connected with said sensing magnetic structure.

67. (previously presented) The structure of claim 66, wherein said pinned magnetic structure has a first direction of magnetization, and said free layer has a second direction of magnetization parallel to said first direction of magnetization.

68. (previously presented) A memory element structure comprising:

a pinned magnetic structure;

a nonmagnetic layer adjacent said pinned magnetic structure; and

a free magnetic structure on a side of said nonmagnetic layer opposite said pinned magnetic layer, wherein said free magnetic structure comprises an antiferromagnetic layer and a ferromagnetic free layer, said ferromagnetic free layer having a non-pinning magnetic bias applied thereto by the antiferromagnetic layer; and

said pinned magnetic structure, nonmagnetic layer and free magnetic structure being patterned to form said memory element.

69. (previously presented) The structure of claim 68, wherein said pinned magnetic structure has a first direction of magnetization, and said free magnetic structure has a second direction of magnetization parallel to said first direction of magnetization.

70. (new) A memory element structure comprising:

a substrate, and a memory element supported by the substrate, the memory element including:

a first conductor supported on the substrate;

a pinned magnetic structure adjoining and electrically connected with said first conductor;

a nonmagnetic layer disposed adjacent said pinned magnetic structure;

a sensing magnetic structure disposed on a side of said nonmagnetic layer opposite to said pinned magnetic structure, said sensing magnetic structure including an antiferromagnetic layer magnetically coupled to at least one ferromagnetic free layer applying a non-pinning magnetic bias to said at least one free layer; and

a second conductor electrically connected with said sensing magnetic structure.

71. (new) The structure of claim 70 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

72. (new) The structure of claim 70 wherein said antiferromagnetic layer includes one or more synthetic layers each comprising two ferromagnetic layers separated by a metal.

73. (new) The structure of claim 70 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

74. (new) The structure of claim 70 wherein said pinned magnetic structure comprises a plurality of layers including at least one pinned layer.

75. (new) The structure of claim 70 wherein said nonmagnetic layer comprises aluminum oxide.

76. (new) The structure of claim 70 wherein said antiferromagnetic layer provides said bias to said ferromagnetic free layer.

77. (new) The structure of claim 76 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

78. (new) The structure of claim 70, wherein said pinned magnetic structure has a first direction of magnetization, and said free layer has a second direction of magnetization parallel to said first direction of magnetization.

79. (new) A memory device comprising:

at least one magnetic random access memory element, said magnetic random access memory element comprising:

a pinned magnetic structure adjacent a conductive layer;

a nonmagnetic layer on a side of said pinned magnetic structure opposite said conductive layer;

a free magnetic structure on a side of said nonmagnetic layer opposite said pinned magnetic structure, wherein said free magnetic structure comprises an antiferromagnetic layer adjacent a ferromagnetic free layer, said ferromagnetic free layer having a non-pinning magnetic bias applied thereto by the antiferromagnetic layer; and

said pinned magnetic structure, nonmagnetic layer and free magnetic structure being patterned to form said memory element.

80. (new) The device of claim 79 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

81. (new) The device of claim 79 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

82. (new) The device of claim 79 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

83. (new) The device of claim 79 wherein said free magnetic structure includes at least one sense layer.

84. (new) The device of claim 79 wherein said pinned magnetic structure includes at least one pinned layer.

85. (new) The device of claim 79 wherein said nonmagnetic layer comprises aluminum oxide.

86. (new) The device of claim 79 wherein said bias is provided by said antiferromagnetic layer.

87. (new) The device of claim 76 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

88. (new) The device of claim 79, wherein said pinned magnetic structure has a first direction of magnetization, and said free magnetic structure has a second direction of magnetization parallel to said first direction of magnetization.

89. (new) A processor-based system, comprising:

a processor; and

an integrated circuit coupled to said processor, said integrated circuit including a plurality of magnetic random access memory elements, each of said magnetic random access memory elements comprising:

a pinned magnetic structure adjacent a conductive layer;

a nonmagnetic layer on a side of said pinned magnetic structure opposite said conductive layer;

a free magnetic structure on a side of said nonmagnetic layer opposite said pinned magnetic structure, wherein said free magnetic structure comprises an antiferromagnetic layer and a ferromagnetic free layer, said ferromagnetic free layer having a non-pinning magnetic bias applied thereto by the antiferromagnetic layer; and

said pinned magnetic structure, nonmagnetic layer and free magnetic structures patterned to form said memory element.

90. (new) The system of claim 89 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

91. (new) The system of claim 89 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

92. (new) The system of claim 89 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

93. (new) The system of claim 89 wherein said free magnetic structure includes at least one sense layer.

94. (new) The system of claim 89 wherein said pinned magnetic structure includes at least one pinned layer.

95. (new) The system of claim 89 wherein said nonmagnetic layer comprises aluminum oxide.

96. (new) The system of claim 89 wherein said bias is provided by said antiferromagnetic layer.

97. (new) The system of claim 96 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

98. (new) The system of claim 89, wherein said pinned magnetic structure has a first direction of magnetization, and said free magnetic structure has a second direction of magnetization parallel to said first direction of magnetization.

99. (new) A magnetic memory element comprising:

a free magnetic layer;

a pinned magnetic layer; and

a non-magnetic layer separating said free magnetic layer and said pinned magnetic layer, said free layer comprising a ferromagnetic layer and an

antiferromagnetic layer, the antiferromagnetic layer supplying a non-pinning magnetic bias to said ferromagnetic layer.

100. (new) The element of claim 99 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

101. (new) The element of claim 99 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

102. (new) The element of claim 99 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

103. (new) The element of claim 99 wherein said pinned magnetic structure includes at least one pinned layer.

104. (new) The element of claim 99 wherein said nonmagnetic layer comprises aluminum oxide.

105. (new) The element of claim 99 wherein said bias is provided by said antiferromagnetic layer.

106. (new) The element of claim 105 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

107. (new) The element of claim 99, wherein said pinned magnetic layer has a first direction of magnetization, and said free layer has a second direction of magnetization parallel to said first direction of magnetization.

108. (new) A memory element structure comprising:

a pinned magnetic structure;

a nonmagnetic layer adjacent said pinned magnetic structure; and

a free magnetic structure on a side of said nonmagnetic layer opposite said pinned magnetic layer, wherein said free magnetic structure comprises an antiferromagnetic layer and a ferromagnetic free layer, said ferromagnetic free layer having a non-pinning magnetic bias applied thereto by the antiferromagnetic layer; and

said pinned magnetic structure, nonmagnetic layer and free magnetic structure being patterned to form said memory element.

109. (new) The structure of claim 108, wherein said pinned magnetic structure has a first direction of magnetization, and said free magnetic structure has a second direction of magnetization parallel to said first direction of magnetization.